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The philosophy of Francis Bacon

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THE PHILOSOPHY OF FRANCIS BACON

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Francis Bacon, the Character of His Life

The life of Bacon is the life of a man endowed with as rare a combination of noble gifts as was ever bestowed on a human intellect. His purpose in life was to do great things and to enlighten and elevate the people of his age. And when the frailty and folly of the man are contrasted with the morality and wisdom of the writer, a most curious exhibition of inconsistency is presented to the student of human nature.

The parents of Bacon were outstanding figures of the time.

For many years Nicholas Bacon was Lord Keeper of the Great Seal of England. Though a man of dignity and control his particular detestation was puns on his name. When a thief by the name of Hogg pleaded for mercy on the grounds of relationship the elder Bacon roared, "You and I cannot be of kin until you have been hanged." (1) We fear the kinship was effected.

Lady Ann, the mother of Bacon, was a most unusual woman for her times. Due to the liberal view of her father that the female of the species could assimilate education she ranked as one of the most learned women of the age. Latin and French formed a workable part of her knowledge and on occasion she could use Greek characters. In addition to mere book learning she

(1) Steel - Sir Francis Bacon - page 2

evidently had a strong will and intellect by which she influenced the entire life of her two sons.

Anthony, the younger brother of Francis, was always handicapped by ill health and was unable to reach the heights his brother attained.

When Francis was twelve the two brothers were sent to Cambridge. Francis left without a degree because of dissatisfaction with the curriculum and particularly the philosophy. (1) Aristotle was set up as the supreme authority and Bacon was eager to accept him as such. But a new star had appeared in a region which Aristotle had declared to be incapable of change and the enthusiastic student lost faith in the ancient sage.

Two years in the diplomatic service that were a delightful adventure on the continent for the young man were interrupted by the death of his father which disclosed the fact that Francis had not been provided with any patrimony. It was necessary for him to seek employment. Despite his excellent record at the French embassy and his connections at Court he was unable to secure preferment.

The royal Court of Elizabeth thrived on an atmosphere of falsehood and intrigue. Greece and Rome were regarded as the model states and Machiavelli was the basis of Court life. (2) Untruthfulness was rampant in the Court and the tricks of procuring advancement were reduced

(1) Campbell, J.L. - Francis Bacon - Page 8

(2) Abbott - Francis Bacon - Page 1

to a system. There was the art of procuring oneself to be surprised; there was the art of writing a letter in which the main point should be casually added or introduced; there was the art of being found reading a letter of which one desired to make known the contents, but not in a direct way; there was the art of laying a bait for a question. An epigrammatic verse of the time told how to win success at Court.

"Gog, lie, flatter and face
Four ways in Court to win men grace.
If thou bethrall to none of these
Away, good Piers. Wome, John Cheese."

The corruption of the Court is often laid to the Queen's parsimony which impelled her aides to reimburse themselves with bribes. Apart from the corruption and mendacity the system of government was radically bad, demoralizing both the governor and the governed. (1) No governor had such power as the Queen. No minister could dare to assume responsibility for the royal actions; the Queen could do no wrong and was accountable to no one. Elizabeth was not the firm ruler of old; now she was aged and directed by unreasonable fancies which her attendants hypocritically approved in the hope of winning advancement.

It was her policy to keep her courtiers apart so that she might command them the better. The rivalries of the parties was so keen and the necessity of always

(1) Abbott- Francis Bacon - Page 3

being in the Queen's eye was so great that the heads of the opposing factions would absent themselves from the country only when summarily ordered. (1) Lord Cecil would not go to France till the Earl of Essex promised not to take advantage of his absence. Amid this rivalry of faction, passion for success, hypocrisy, treachery, deceit, and servility Bacon at first failed to find a place. However, with the aid of his brother he began to study law until such time as he won an appointment. Bacon applied somewhat tactlessly to his uncle, Lord Burleigh for help and drew only a rebuff. The Lord had a son of his own who would need all his patronage.

In these years the character of Bacon is revealed by his actions. The walks and gardens of Gray's Inn were beautified under the loving hands of an artist. Shrubs and flowers and trees were dotted among terraces and squares of intricate designs. In the evening the historians Tacitus and Livy and the philosophers Hippocrates and Aristotle occupied his time and he wrote some on the affairs of the state. One wonders what Bacon would have produced if he had had a Maecenas. All his blemishes seem to come from his connection with a life in which he had no interest save that of getting enough money to satisfy his expensive tastes. If that had not been necessary possibly his writings and his character would have been in closer agreement. Circumstances often harm character as it is expressed in action.

Owing to some unknown influence Bacon was elected to Parliament in which he gained no special distinction though he spoke constantly. But he was meditating upon a scheme which concerned neither law nor politics.

In his twenty-fifth year Francis Bacon published his first philosophical essay which was entitled "The Greatest Birth of Time". The only importance of this work was that it was the first indication that he was to write philosophical papers. Six years later he disclosed a project that was so vast that it was only partially fulfilled. At Cambridge Bacon had said of Aristotle, "He was only strong for disputations and contentions, but barren of works for the benefit of the life of man." Now the ideas of Bacon had taken form and he wrote, "For I have taken all knowledge to be my province; and if I could purge it of two sorts of rovers, whereof the one with frivolous diſputations, and verboſities, the other with blind experiments and auricular traditions and impoſtures, hath committed ſo many ſpoils, I hope I ſhould bring in induſtrious obſervations, grounded conclusions, and profitable inventions and discoveries; the beſt ſtate of that province. This, whether it be curioſity or vain glory ... is ſo fixed in my mind as it cannot be removed. and I do eaſily ſee, that place of any reaſonable countenance doth bring commandment of more wits than of a man's own; which it is the thing I greatly affect. " (1)

(1) Steel - Sir Francis Bacon - Page 18

The curriculum of the university had remained unchanged for centuries. (1) Aristotle was studied and imitated and the dialectic method applied to countless questions. Usually the discussion was about theology, to the utter neglect of the natural sciences. By Aristotle's method one was taught, but one would not discover new truths. Bacon felt that there were many new things to be unfolded and that this discovery was more important than the demonstration of old ones. (2) He rejected the method of classification for that of experiment. With high hopes he sought to dispose of two fundamental errors: the idle discussion of trivial questions and the discussion of an important question by an ineffective method.

The means of accomplishing this was to be "The Grand Instauration". This was to include the reformation of philosophy and the verification of conclusions by experiments. Practically all of his writings are part of this work.

Soon after the announcement of his project Bacon

(1) Steel - Sir Francis Bacon - Page 20

(2) Abbott - Francis Bacon - Page 333

became an intimate of the Earl of Essex, the rising favorite at Court. But Bacon tactlessly opposed certain measures that the Queen favored and the influence of Essex went for nought. When the office of Attorney-General became vacant Bacon and Edward Coke were rivals for the position. Good Queen Bess kept the contestants in suspense for over a year. Coke won the appointment.

Bacon was discouraged. He was deeply in debt and only a poor lawyer who received but an occasional commission. Even Essex could not secure for him the minor office of Solicitor-General. Unable to give him political help the Earl presented Bacon with an estate. Essex then tried to aid him in the matrimonial field without success. A good wife of wealth would have been an asset to an ambitious young man. But the object of this intrigue, Lady Hatton, married the rival Coke.

Essex was appointed Governor-General of Ireland. There he conducted affairs in a way contrary to the expressed wishes of the Queen and on his return to England he was held for trial. A special court was constituted and Bacon was named the Queen's lawyer whose duty it was to read in public the offences of the Earl. Possibly the Queen was testing the loyalty of her subject. At any rate Bacon read the charges and Essex was stripped of his offices and honors.

With the assistance of Bacon the Earl regained his liberty. But Elizabeth refused to receive him at Court. Thereupon he made a wild attempt to arouse a revolution against the Queen. He was arrested again and charged with high treason. Bacon was selected to assist Coke in the prosecution and showed no hesitancy in indicating that he was out of sympathy with Essex. Twice during the progress of the trial Coke blundered in his procedure and twice Bacon stepped forward and clarified the charges against his former friend. Essex was executed. Bacon received twelve hundred pounds for his services and later wrote an apology for his action. (1) For this active and apparently unnecessary participation in the prosecution of his friend Bacon has received more blame than for any other act of his life. It may be said that Essex was really a dangerous person to the state and that Bacon had warned him that he would not support him. (2) Also, Bacon was unwilling to lose favor at Court. Yet it is hard to condone his desire to profit by the misfortune of his friend.

After the accession of James I, Bacon continued his active work in Parliament, was knighted, and received a small pension.

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- (1) Steel - Sir Francis Bacon - Page 53
 - (2) Abbott - Francis Bacon - Page 81
 - (3) Lovejoy - Francis Bacon - Page 51

Of his domestic life we know little except that it ended unhappily. In 1606 he married Alice Barnham, a woman of considerable wealth, and in his last will he revoked all provisions made for her benefit. A man about London wrote of the ceremony, "Sir Francis Bacon was married yesterday to his young wench, in Maribone Chapel. He was clad from top to toe in purple, and hath made himself and his wife such store of raiments of cloth of silver and gold that it draws deep into her portion." (1) The wealth of Alice was useful, for Francis had expensive tastes. All in all Bacon's energies seem to have been directed in paths other than romantic ones.

His fortunes took on a new glory. A successful marriage, the Solicitorship, and another office added materially to his finances.

In 1613, after twenty years of seeking, Bacon acquired the office of Attorney-General and at once used his power to secure the removal of Coke from the King's bench for insufficient subserviency to the Crown. But Coke was not crushed.

The personal advancement of the sometime philosopher was rising steadily. When Villiers, later the Duke of Buckingham, became the favorite of the King, Bacon was one of his satellites.

On receiving the title of Lord Keeper of the Great Seal, Bacon entertained lavishly and frequently, and was an important figure in the life of London.

Despite a busy public life he was not neglecting the "Great Instauration" and in 1620 he published the entire second section of that plan - the "Novum Organum."

Bacon did not belong to that type of philosopher known as "plain living and high thinking." At Gorhambury he spent some of his wealth upon his country home.

The feature of his gardens was a series of lakes which covered four acres and on whose bottoms designs were wrought in pebbles. On an island in the middle of one of the ponds stood a banqueting house of Roman architecture. In London at York house Bacon lived in even greater splendor. More than a hundred servants were

on the staff of the house, but many of them were merely youths of good families who were living on the bounty of the master. Expenditures were on a large scale.

Linen, lace, ruffs, cuffs, and shirts ran into enormous bills. Tailors, perfumers, and all other merchants found him a ready customer. Music was with him at all times.

At meals and during his meditations musicians were his constant attendants. Liberal tips were given to the Court players and to those at any house where he was a guest. Flowers were strewn about because he took delight in their delicate aroma. In the garden at York house he had constructed an aviary which he filled with valuable birds.

He took the most elaborate care of his health and was continually concerned with means of preserving his youth. (1) One preparation he concocted was composed of claret wine, rosemary, pearl powder, milk, cucumber, gold, crab shells, and chalk. (2) This was taken internally. But remedies against the gout and stomach pains, and directions for the spending of his time, and frequent relaxation failed to give him good health, for he was subject to fainting spells which left him very weak.

A person with the prosaic name of Lionel Cranfield caused Bacon to fall suddenly from the position which it had taken him years to attain. This son of a London merchant had become a member of the Privy council by reason of his keen business ability. At Court it was his task to stem the enormous outward flow of money. In his investigations he uncovered great scandals and later he was removed from office because of the appropriation to his own pocket of the money which he was saving the government. The questions he raised about monopolies made him the fatal star of Bacon's life. For many years the King had given monopolies or patents which empowered the holders to set a tax on all people engaged in certain activities. The two outstanding patents were those given over ale houses and lace-makers. (3) A pair of lowly lace-makers had been

(1) J.L. Campbell - Francis Bacon - Page 227

(2) Steel - Sir Francis Bacon - Page 130

(3) Lovejoy - Francis Bacon - Page 131

selling great quantities of counterfeit lace. When Cranfield delved into this he discovered that these makers were granted their privileges by Buckingham and that Bacon had signed these patents as legal to whomever Buckingham recommended. It seemed that because of the high position of those involved, the affair would be hushed up, but Cranfield was persistent. He informed the King that one of the miscreants would have to be handed over to Parliament, and the King, in order to protect his favorite, left Bacon to the mercy of the investigation. (1) Coke was now back in the House and he was insistent in demanding that the guilty ones be brought to trial although no names had yet been mentioned in public. Bacon at first thought that the impending storm would blow over, but the gathering clouds showed him that he must take action. With the aid of James he was able to postpone the hearing for a few days. When Cranfield realized whither the path led he was willing to drop the charges, but Coke took up the sword and said that Parliament could not overlook its duty. The charge of accepting bribes was read against Bacon in the House of Lords and the House of Commons. The names of the other referees were dropped from consideration. This angle of attack was one entirely unsuspected by Bacon. From time immemorial money had been taken on the side by the holder of that office. Nor did it

(1) Steel - Sir Francis Bacon - Page 138

seem to matter that those who had given bribes had received adverse decisions, which showed that either Bacon did not know of the bribes or else had not allowed them to influence his judgments. More charges were piled up. Bacon realized the futility of fighting, especially when he saw that no one was coming to his aid. (1)

The philosopher was without strong friends who might help him out of his predicament. His personality was not conducive to the formation of many friendships, yet the few who did become his intimates had great admiration for and faith in him.

Toby Matthew, son of the bishop of Durham, was the principal confidant of Bacon's literary projects. Matthew was fond of literature and of travel and Bacon had a great respect for his literary judgment and a strong personal affection for him. While traveling on the Continent Toby was converted to Catholicism and on his return to England he was detained. When he refused to deny his new faith he was committed to the Fleet. However, he was shortly released from prison on the condition of going into exile; but his literary correspondence with Bacon was not broken. At the request of Matthew, Bacon wrote the "Essay on Friendship", as a kind of memorial of the bond that had united them.

Dr. Rawley, the chaplain, was the intimate of Bacon during much of his work and was also his biographer.

(1) J.L. Campbell - Francis Bacon - Page 181

The third close friend was Peter Boener, his apothecary and secretary.

Not an imposing array. They are names little known in so brilliant an age, yet they were staunch supporters of a not too steady mast. Obviously they could not rescue their idol from this turmoil.

Confessing to the accusations, Bacon placed himself at the mercy of the Lords. The punishment was a fine of forty thousand pounds, imprisonment in the Tower during the King's pleasure, disbarment from sitting in Parliament or holding any office, and banishment from London. However, the fine was remitted, the imprisonment lasted for four days, and permission was given him to come within the verge of the Court.

Bacon lived but five years after his disgrace and his death was pathetic. On a cold day in March he bought a hen and himself stuffed it with snow to test the effect of cold in arresting putrefaction. A severe chill fastened on him and he died on Easter morning, 1626.

The Character of Bacon

Among the roistering crew of tavern habitues who reigned supreme with good Queen Bess the character of Francis Bacon stands unique and solitary with its complex combinations of good and evil. Some of the evil may be gathered from his official actions and more from his private letters, for he was frank to commit to paper his own defects and infirmities. The good traits of the philosopher are found in the testimony of his one or two intimate friends, who, even after his disgrace and death, praised him as being genial, kindly, affectionate, and highly virtuous.

The short memoir of Bacon written by his chaplain Rawley breathes a spirit of genuine affection. His domestic apothecary and secretary, Peter Boener, expresses a wish that a statue of him may be erected, not for his learning and researches, but "as a memorable example to all, of virtue, kindness, peacefulness, and patience." Ben Jonson speaks in the same strain of his "virtue"; he could never bring himself, he says, to condole with the great man after his fall because he knew that no accident could do harm to his virtue, but rather serve to make it manifest. Toby Matthew writes to the same effect: "It is not his greatness that

I admire , but his virtue. It is not the favors I have received of him that have enthralled and enchained my heart, but his whole life and character; which are such that, if he were of an inferior condition, I could not honor him the less, and if he were my enemy, I should not the less love and endeavour to serve him."

It is known that Bacon's treatment of Essex was ungenerous and ungrateful; that he flattered Cecil to the day of his death and then mercilessly criticised him; that he harbored a strong hatred for Coke; That he urged the King to delude Somerset with false promises. (1) Yet, in spite of these damaging facts, Bacon was known to an intimate few as a character of ideal qualities. And Bacon himself retained a high personal regard in all these actions which he performed deliberately, for indeed he looked them in the face before doing them, by setting them down on paper.

Bacon lived two lives that were separable to an extraordinary degree, a public life and a scientific life. He felt that he was born for the service of mankind and to help men by extending their dominion over Nature. But birth and education diverted him to politics. Still he hoped that if he rose to eminence in the State he should have a larger command of industry and ability to help in his philosophic work. As he plunged deeper into the excitement of civil life he began to love pomp and position and power for their own sake.

(1) Lovejoy - Francis Bacon - Page 184

When his lot was cast in political circles Bacon believed that he must not despise the ordinary means of attaining success in that field. He thought, as is revealed in the "Essays", that there is a contrast between ideal virtue and a practical standard of conduct. At moments in his life he appears to have judged himself by a higher standard of morality, but for the most part he succeeded in suppressing his conscience. (1)

Very often a versatile mind is a source of moral danger. So it was with Bacon. He always planned and intended to go his own way, but if he could not, then he went the way of his employers. He wrote to Queen Elizabeth in one of his papers, "I am bold to think it, till I think that you think otherwise." Again, he wrote to Buckingham, "Howsoever let me know your will, and I go your way." Such compliance did not make for a strong character.

With all his faults we are reluctant to condemn Bacon. The last five years of his life were a period of expiation which were brought to a close by a humble search for truth which a servant might have been directed to do.

Macaulay and the Baconian Philosophy

Let us now leave the man and consider the legacy that he has left to the world.

Macaulay writes: "The aim of Bacon was utility, - fruit; The multiplication of human enjoyments, the mitigation of human sufferings, the prolongation of life by new inventions. Hence, the first shoemaker has rendered more substantial service to mankind than the sages of Greece. All they could do was to fill the world with long beards and long words; whereas the philosophy of Bacon has lengthened life, mitigated pain, extinguished disease, built bridges, guided the thunderbolts, lightened the night with the splendor of the day, accelerated motion, annihilated distance, facilitated intercourse; enabled men to descend to the depths of the earth, to traverse the land in cars which whirl without horses, and the ocean in ships which sail against the wind."

In other words, he wished to have not only principles but works. (1) It was his aim to stimulate mankind, not to seek unattainable truth, but useful truth; that is, the science which produces railroads, canals, cultivated farms, ships - all that purchase the joys of material life and fit us for dominion over the world in which we live. Therefore, anything which will curtail our sufferings and add to our pleasure should

(1) Doherty - Flaws in the Philosophy of Bacon - Page 301

be sought as the highest good. Geometry is desirable as a handmaid to natural philosophy; astronomy is only to verify degrees of latitude and to regulate clocks. A college is not designed to train and discipline the mind, but to utilize science and to become a school of technology. Greek and Latin exercises are comparatively worthless, and even mathematics, unless they can be converted into practical use. Philosophy, considered as metaphysics, is most idle of all, since it does not pertain to mundane things. Theology is not of much account because it pertains to mysteries we cannot solve. It is not with heaven or hell, or abstract inquiries, or divine certitudes that we have to do, but the things of earth,- things that advance our material and outward condition. To be rich and comfortable is the end of life, not meditations or abstract and eternal truth, such as elevate the soul or prepare it for a future and endless life. The certitudes of faith, of love, of friendship are of small value when compared with the blessings of outward prosperity. Utilitarianism is the true philosophy for this confines to the world where we are born to labor, and enables us to make acquisitions which promote our comfort and ease. (1) The chemist and the manufacturer are our greatest benefactors, for they make for us the things that we must have. (2) The philosophy of Francis Bacon is an immense

(1) Macaulay - Lord Bacon - Page 113

(2) Lord - Beacon Lights of History - Page 435

improvement on all previous systems, since it heralds the jubilee of trades, the millenium of merchants, the schools of thrift, and the pioneers of enterprise. Its watchword is progress. The conquests and acquisitions in the material world are real, are practical; machinery over life, the triumph of physical forces, dominion over waves and wind, - these are the great victories which consummate the happiness of man; and they flow from the philosophy which Bacon taught. (1)

Now Macaulay does not directly say all these things, but these are the spirit and gist which he puts upon Bacon's writings. The philosophy leads directly to these blessings, and these constitute its great peculiarity. It cannot be denied that the new era which Bacon heralded was fruitful in these very things, that his philosophy encouraged the development of material forces. But it may be questioned whether he had not something else in view than mere utility and physical progress, and whether his method might not equally well be applied to metaphysical subjects. (2) His method seems to pertain to the whole domain of truth and the whole realm of human inquiry. Bacon was interested not only in the world of matter, but in the world of mind. (3) He sought to establish principles from which sound deductions might be made, as well as to establish reliable inductions. Bacon does not sneer

(1) Macaulay - Lord Bacon - Page 115

(2) J.L. Campbell - Francis Bacon - Page 223

(3) Lord - Beacon Lights of History - Page 437

as Macaulay does at the ancient philosophers. He bears testimony to their genius and their unrivalled dialectical powers, even if he regards their speculations as frequently barren. He does not flippantly ridicule their ideas and expressions. Nor does he belittle metaphysical science if properly directed, still less on noble inquiries after God and the mysteries of life. He is subjective as well as objective. He embraces philosophy in its broadest meaning, as it takes in the province of the understanding, the memory, and the will, as well as of man in society. He speaks of the principles of government and of the fountains of law; of universal justice and of eternal spiritual truth. Nor did Bacon despise metaphysical science, only the frivolous questions which the old scholastics associated with it and the general barrenness of their speculations. True, he sought definite knowledge, - something firm to stand upon and which could not be controverted. No philosophy can be sound when the principles from which deductions are made is not itself certain or very highly probable; or when this principle, pushed to its utmost logical sequence, would lead to absurdity, or even to a conflict with human consciousness. To Bacon the old methods were wrong, and it was his primal aim to reform the scientific methods in order to arrive at truth; not truth for utilitarian ends chiefly, but truth for its own sake,

The New Philosophy of Bacon

Now the method which was almost exclusively used until Bacon's time is commonly called the deductive method; that is, some principle or premise was assumed to be true, and deductions were made from this assumption. No especial fault was found with the reasoning of the great masters of logic like Aristotle and Thomas Aquinas, for it has never been surpassed in acuteness and severity. If their premises were admitted, their conclusions would follow as a certainty. What was wanted was to establish the truth of the premises or the general propositions. This Bacon affirmed could be arrived at only by induction; that is, the ascending from ascertained individual facts to general principles, by extending what is true of particulars to the whole class in which they belong. Bacon has been called the father of inductive science, since he employed the inductive method. Yet he is not truly the father of induction, for it has been practised by every human being since the beginning of the world. (1) Bacon was the missionary of induction. (2) The error the ancients made was in not collecting a sufficient number of facts to warrant a sound induction. And the ancients looked for facts to support some preconceived theory, from which they reasoned syllogistically. The theory could not be substantiated by any syllogistic

(1) Doherty - Flaws in the Philosophy of Francis Bacon-Page 287

(2) Lovejoy - Francis Bacon - Page 185

reasonings, since conclusions could never go beyond the assumptions; if the assumptions were wrong, no ingenious or elaborate reasoning would avail anything toward the discovery of truth, but could only uphold what was assumed.

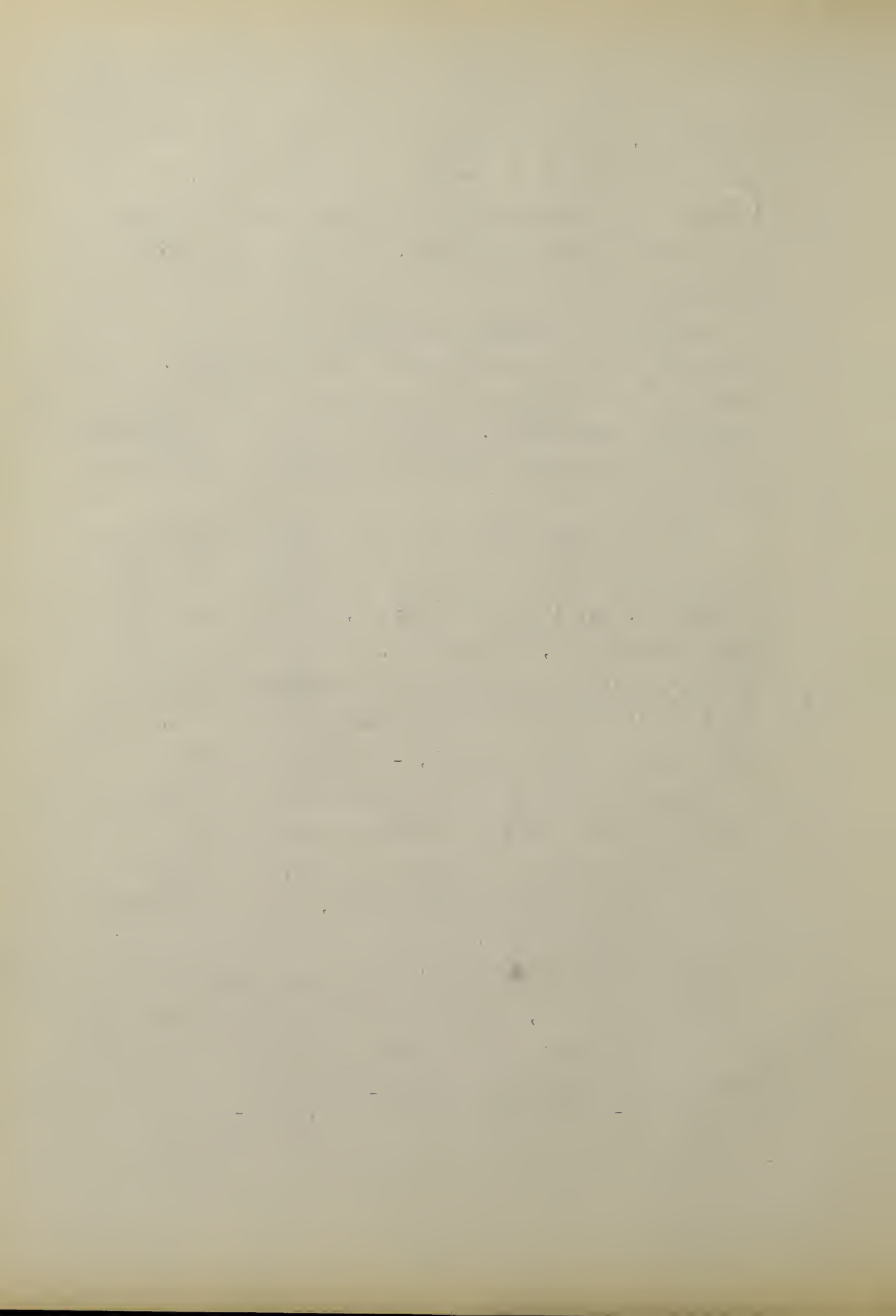
Having fundamental processes which cannot be gainsaid, we may philosophically draw deductions. Bacon did not make war on deduction, when its formal truths are established. Deduction is as much a necessary part of philosophy as induction. Deduction also enters into science.

But deductive logic is the creation of Aristotle; and it was the authority of Aristotle that Bacon sought to subvert. The inductive process, of which Bacon is called the father, is also old. How are these things to be reconciled and explained? Wherein and how did Bacon adapt his method to the discovery of truth, which was his principal aim, - that method which is the great cause of modern progress in science, the way to it being indicated by him pre-eminently?

The whole thing consists in this, that Bacon pointed out the right road to truth, - as a sign-board where two roads meet or diverge indicates the one which is to be followed. (1) He did not make a system like Descartes, Spinoza, or Newton. He showed the way to make it on sound principles. He laid down a systematic (2)

(1) Robertson - Baconian Heresy- Page 583

(2) Cajori - Scientific Monthly, Jan, 1925 - 87



analysis and arrangement of of inductive evidence. He declared the the syllogism used by Aristotle and the Schoolmen was from its very nature incompetent to prove the ultimate premises from which it proceeds; and when the truth of these remains doubtful, we can place no confidence in the conclusions drawn from them. Hence, the first step in the reform of science is to review its ultimate principles ; and the first condition of a scientific method is that it shall be competent to conduct such an inquiry; and this method is applicable not only to physical science, but to the whole realm of knowledge. This, of course, includes poetry, art, intellectual philosophy, and theology, as well as geology and chemistry.

And it is this breadth of inquiry - directed to subjective as well as objective knowledge - which made Bacon so great a benefactor. (1) The defect in Macaulay's criticism is that he makes Bacon interested in mere outward phenomena, or matters of practical utility, a worldly utilitarian of whom Epicureans might be proud. Take for instance his "Phantoms of the Human Mind," which form the best known part of the "Novum Organum." "The Idols of the Tribe" would show the folly of attempting to penetrate further than the limits of the human faculties permit, as also the liability of the intellect to be warped by the will and the affections. "The Idols of the Den" have reference

(1) Lord - Beacon Lights of History - Page 444

to the tendency to notice differences rather than resemblances, or resemblances rather than differences, in attachment to novelty or minute details. The "Idols of the Market-Place" have reference to the tendency to confound words with things, which has ever marked controversialists in their disputes. The "Idols of the Theatre" have reference to perverse laws of demonstration which are the strongholds of error. This school deals in speculations and experiments confined to a narrow compass.

Bacon, having completed his discussion of the "Idola", then proceeds to point out the weaknesses of the old philosophies, which produced leaves rather than fruit, and were stationary in their character. Here he would seem to lean towards Utilitarianism were it not that he is as severe on men of experiment as on men of dogma. (1) He says, "The men of experiment are like ants, they only collect and use; the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes a middle course; it gathers the material from the flowers, but digests it by a power of its own... So true philosophy neither chiefly relies on the powers of the mind, nor takes the matter which it gathers and lays it up in the memory, whole as it finds it, but lays it up in the understanding, to be transformed and digested." Here he simply points out the laws by which true knowledge

is to be attained. He does not extol physical science alone, though doubtless he had a preference for it. He was English and the English mind is objective rather than subjective, and is prone to value the outward above the inward.

One of Bacon's longest works is the "Silva Sylvarum," a sort of natural history, in which he treats of the various forces and productions of nature, - the air, the sea, the winds, the clouds, plants and animals, fire and water, sounds and discords, colors and smells, heat and cold, disease and health; but which varied subjects he presents to communicate knowledge, with no utilitarian end.

"The Advancement of Learning" is one of Bacon's most famous productions, but its purpose is not to enable men to become rich or powerful or comfortable. (1) It is rather an abstract treatise as dry to many people as a disquisition on law. It is a profound dissertation on the excellence of learning; its great divisions treating of history, poetry, and philosophy, - of metaphysical as well as physical philosophy; of the province of understanding, the memory, the will, the reason, and the imagination; and of man in society, of government, of universal justice, of the fountains of law, and of revealed religion.

And if we turn from the new method by which he would advance all knowledge, and on which his fame as

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a philosopher chiefly rests, - that method which has led to discoveries that Bacon never even dreamed of, not thinking of the fruit he was to bestow, but only the way to secure it, - even as an inventor thinks more of his invention than of the money that he may reap from it. If we turn from this "method" to the other writings of Bacon, what do we find? Simply the thoughts of a man of letters, the moral wisdom of the moralist. Written, not to gain a living, but only to give vent to burning ideas, these writings had no worldly purpose. Perhaps the only thing Bacon sought was imperishable fame. He wrote amid the cares and worries of a great public office and amid the pains of disease and the infirmities of old age.

His essays, that are among his best known works, are brilliant, suggestive, forcible, and rich. Surely these are not on material subjects, and indicate anything but a worldly or sordid nature. In these famous essays we read those great certitudes which console in affliction, which kindle hope, which inspire lofty resolutions. What beauty is contained in his thoughts on death, on adversity, on glory, on anger, on friendship, on fame, on ambition, on riches, and on many other subjects of moral import, which show the elevation of his soul. He does not dwell on food, drink, or clothes, but on the truths which appeal to our higher nature, and which raise the thoughts of men from mundane things to heaven. (1)

Then, it is necessary that we should take in view the other labors which dignified Bacon's retirement. Let us remember his histories, biographies, legal treatises, political discourses, tracts, speeches, and letters; all of which related to the benefit of others rather than himself. We should consider these labors, as well as the new method he taught in order to arrive at an estimate of the sage. He took away the syllogism from Thomas Aquinas, not to throw contempt on metaphysical inquiry or dialectical reasoning, but to arrive by a better method at the knowledge of first principles. (1) Once these were established he allowed deductions to be drawn from them, leading to other truths as certainly as induction itself. The method of induction was not his only legacy, for other things which he taught were as valuable, not merely in his sight, but to the eye of enlightened reason. There are other truths besides those of physical science. Geometry, which is now taught as Euclid first demonstrated it, since it cannot be improved, is purely an example of deductive science. The scholastic confirmed what was valuable in the old systems, trained the mind by the severity of its logic and its dialectical subtleties; and this was based on deductions never wrong unless the premises are unsound. Theology is deductive reasoning from truths assumed to be fundamental. Is not this science worthy of some regard?

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What is more certain than deduction when the principles from which it reasons are indisputably established?

Is induction, great as it is , especially in the explorations of Nature and science, always certain? Are not most of the sciences which are based upon it progressive? We have not yet learned the ultimate principles of political economy, of geology, of government, or of art.

And although it is supposed that the inductive method of Bacon has led to the noblest discoveries of modern times, is this strictly true? Galileo made his discoveries in the heavens before Bacon died. Physical improvements must needs follow such inventions as the compass and printing. Physical developments arise from the development of man, whatever method may be recommended by the philosophers. What philosophical teachings led to the machinery found in mines and mills? Some think that our modern improvements would have come whether Bacon lived or not. But I would not disparage the labors of Bacon in pointing out the method which led to scientific discoveries. Granting that he sought merely utility I would not under-rate his legacy. It is a pleasant thing to ride in fast and comfortable vehicles, to cross the ocean in safety, and to enter a warm, cheerful room on the coldest day of the year. Are we not astonished at the bridges and buildings and machines that rise about us? We feel that giants have eased us of our burdens.

But great and beneficent as are these blessings, they are not the only certitudes, nor are they the greatest. An outward life of ease and comfort is not the chief end of man. The interests of the soul are more important than any comforts of the body. The higher life is only reached by lofty contemplation on the true, the beautiful, and the good. Subjective wisdom is worth more than objective knowledge. What are the great realities, - machines, laces, diamonds? Or are they affections, friendships, impulses, and noble thoughts? The wonders of science are great, but so also are the secrets of the soul, the mysteries of the spiritual life, the truths which come from divine revelation. Whatever most dignifies humanity, makes our labor light, and prompts us to sacrifice is the most real and the most useful. Even the leaves of a barren and neglected philosophy may be in some important respects of more value than the boasted results of utilitarian science. Is that which gives the highest pleasure always the most valuable? The noblest things of life are found in the immaterial by the human mind.

Errors in the Baconian Philosophy

It is one of the strangest caprices of fame that all the grand results of modern scientific research and mechanical research should be ascribed, as their originator and father, to Lord Bacon, who was indeed one of the greatest men of letters of his time, some of whose writings are justly ranked among the classic works of English literature, but who never had any claim to be considered an authority in matters of science, even as it stood in his own age. At present there are many who have been reluctantly convinced that Bacon was not much of a scientific man, but who still maintain that he was a great philosopher. His influence on the course and progress of modern science has been greatly over-rated. (1)

The "Novum Organum" is an extraordinary work; but it is more remarkable for what it attempted to do than for what it did. By the mere title the author put himself into competition with the most influential, if not the greatest, of the ancient philosophers. He undertook to make all things new. Men were not only to unlearn all the old forms of philosophic speech, but they were even to be taught to think as they had been incapable of thinking before. Bacon appropriated a great deal of the teachings of Aristotle. But he did

(1) Doherty -- Page 284

not succeed in prevailing upon any considerable number of educated men to substitute his fanciful terminology for that to which they had been accustomed.

Bacon did not invent induction. Was he, then, the first to analyse the process? No, that which he professed to undertake had been thoroughly and efficiently done many years before by Aristotle. In the very start Bacon was at fault in two things - he was wrong in taking for his object the essences or forms of things, which can rarely, if ever, be discovered; and he was wrong as to his method by imagining that of itself, and independently of the capacity of him who applied it, it must lead to successful results.

Lord Bacon laboriously devised a method which was to be the sole and infallible rule of scientific discovery; and few scientific discoveries have been made in this way. (1) The first hands in which this method failed in application were Bacon's own. His "Inquisition into the Nature of Heat", as an example of the mode of interrogating Nature, can only be considered as a complete failure. (2) Instead of being a brilliant example of legitimate deduction, it is a conspicuous illicit generalization. Macaulay exposes its defects when he shows that by a similar process one may arrive at the conclusion that every man who has three names is a Jacobin. However, Bacon seems to have made a pretty fair guess at the nature

(1) Cajori - Scientific Monthly - Jan. 1925 - Page 87
 (2) Doherty- Page 289

of heat, though his conclusion is not reached by any legitimate process of reasoning. In his denunciation of hypothesis he has lost sight of the distinction between a purely gratuitous hypothesis and one founded on probable grounds. The same distinction holds good in the common affairs of life between a random guess and a shrewd one. In his theory of heat he seems to have anticipated Professor Tyndall who holds that it is a "mode of motion." (1) It cannot be denied, however, that Bacon's notion was very vague and scientifically unsound; for he says of heat that it is "an expansive restrained motion, modified in many ways, and exerted in the smaller particles of the body." It is for his interpreters to explain how a motion can at once be expansive and restrained, and how an action, which evidently affects the whole body, can be exerted only in its smaller particles.

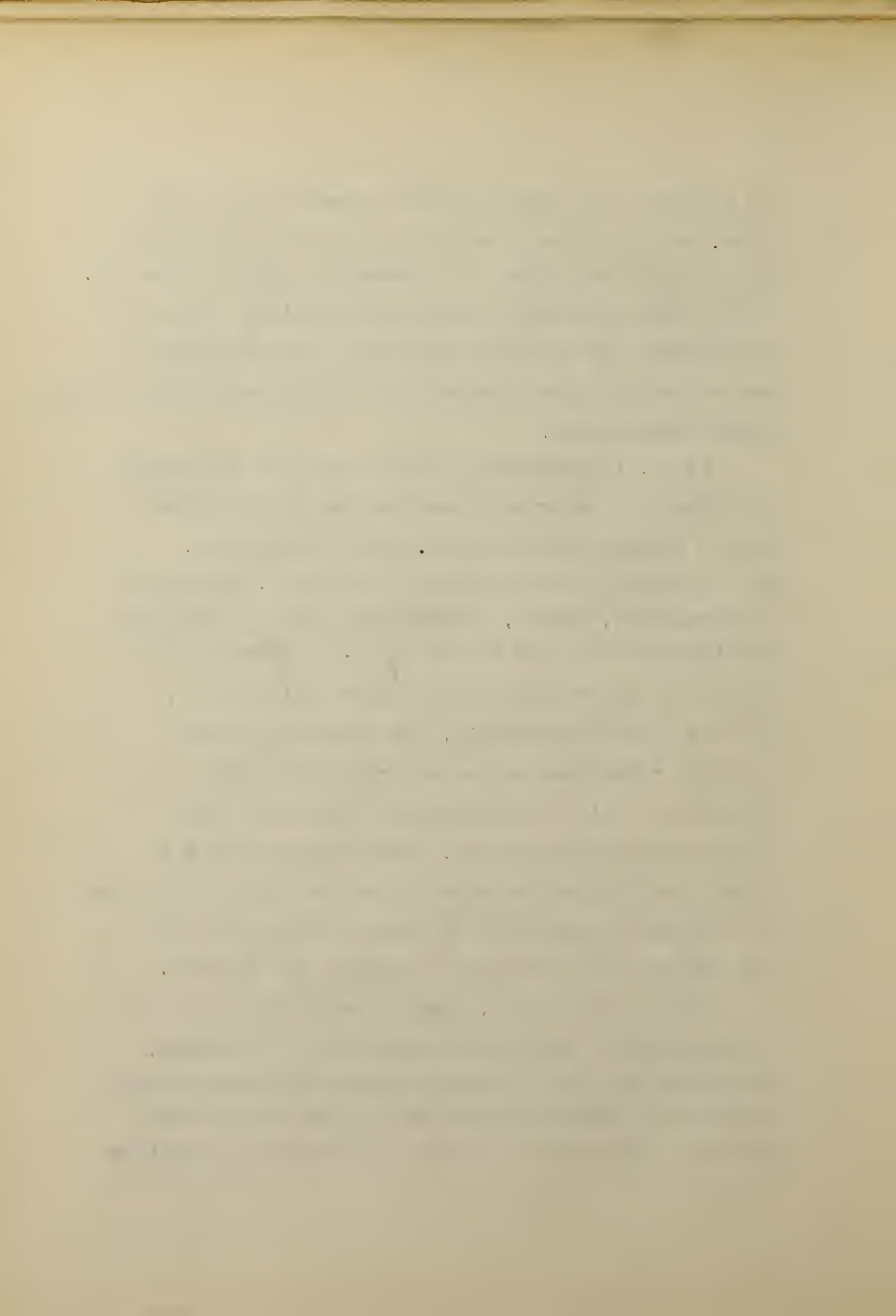
Bacon has been hailed as the great apostle of experimental philosophy. Now, in order to merit that title, it should be made clear either, in the first place, that he was the first to turn the minds of men, previously directed to other pursuits, to the study of experimental science; or, secondly, that no results of any consequence in that way had been attained before he took the task in hand; or, thirdly, that his contributions to physical science were so conspicuous and

(1) Cohen - Scientific Monthly, Dec. 1926 - Page 505

so valuable as to put all other competitors to one side. Certainly Bacon was not the first to appreciate the worth of experiment, a discovery as old as humanity. Plato, though opposed to Bacon in doctrines, rightly apprehended the value of experiment. And to Aristotle may be ascribed the foundation of a philosophy distinctively named experimental.

Is it, in the second place, true that the results of scientific experiment were few and insignificant before Bacon lived and wrote? Quite the reverse. We may mention the wisdom of the ancients. Such names as Archimedes, Euclid, and Ptolemy show that important discoveries were made before Bacon. But there is no doubt that in the age to which Bacon belonged, as in that which preceded it, the physical sciences received a new impulse and afterwards attained a development which in many respects left the wisdom of the ancients far behind. Among those entitled to credit for this new advancement are da Vinci, Copernicus, who occupies a high place in experimental philosophy and who preceded Bacon by a century, and Gilbert.

In the third place, Bacon's actual contributions to experimental science were worth next to nothing. To many it will seem incredible that this philosophical reformer had very erroneous and absurd notions about most scientific matters. Bacon rejected the Copernican



system, and said that it was conceived in the utter license of the imagination, and that it was evidently absurd. (1) Again, Galileo greatly improved the telescope and by the discoveries which this new instrument enabled him to make, he may be almost have said to renewed the science of astronomy. But Bacon sneered at the telescope, and also entertained the peculiar opinion that mathematics were no help to astronomy.

But without the telescope and without mathematics where would modern astronomy be? He ridiculed the microscope; and he objected to spectacles because they only remedied the defects of vision and taught us nothing new. (2) He complained that arithmetical calculations were too slow and demanded a method of performing them faster. But when told that algebra was just what he wanted, he condemned it as mystic and as an aberration of theory. Of course he ridiculed the alchemists; but he shared some of their delusions, for he thought that gold could be made artificially. As a help to longevity he recommends that gold dust mixed with some powdered diamonds or pearls should be taken the first thing in the morning in a glass of white wine. Bacon is praised for having turned men's thoughts to the pursuit of material good, and for having given to minds which might otherwise have been unprofitably occupied in the consideration of man's eternal destiny the practical direction of studying

(1) Cohen - Scientific Monthly, Dec. 1926 - Page 505

(2) Wright - Scientific Monthly, Jan. 1928 - Page 40

to increase the comforts of life. It is curious that in his enumeration of the results to be expected from following the pursuits which he advised, he includes instruments of destruction, of war, and of poison. So that he manifestly contemplated as among the comforts of life the power to inflict death on your enemies, or perhaps on those who had been too much your friends. These materialistic ideas are amplified by Macaulay into a magnificent eulogy of the new philosophy, which undoubtedly has attained great and beneficial results; but the question is, how far has Bacon contributed to them? He has himself determined his true position in a phrase which describes it more correctly than perhaps he was altogether conscious of: "*Ege buccinator tantum.*" Only a trumpeter. Nothing more. A trumpeter arrayed in all the splendor of a Commander-in-chief, and who drew forth from his instrument notes of infinite variety, melodious and charming, but whose place was by no means in the van of the great army of investigators. (1) Bacon has been called the apostle and the martyr of science. Surely we have shown that he was not the first and his martyrdom was death by a cold.

If it be alleged that the great merit of Bacon's philosophy was not that he urged men to make experiments, but that he impressed on them the necessity of doing this with more caution than they had used before, (2)

(1) Church- Francis Bacon - Page 179

(2) Cohen - Scientific Monthly, Dec. 1926 - Page 507

it may be said, that he was preaching to those who knew their own business better than he did. Galileo, for instance, taught the same lesson, but he put it in practice with results greater than Bacon, with all his power of imagination could dream of. But, in the next place, Kepler, the friend and fellow-laborer of Galileo, was not a plodding experimentalist, but a daring speculator, a man whose brain teemed with hypotheses and who, by that very quality, made additions to science of the most wonderful and important character. Again, it may be observed that it is not upon the mere enumerations or repetitions of facts that sound induction is based. The mind will often, not irrationally, infer a general law from a particular instance, when that instance clearly represents a class of cases. Such generalization may be called hasty, but it is not illicit. It is the mind of the experimentalist alone that can seize the connection between the facts. It was once objected to Galileo that, in a certain proof from induction, he had not exhausted all the particulars; to which he replied that if induction were required to pass through all the cases it would be either useless or impossible; impossible when the cases are innumerable; useless when they have each already been verified, for the general proposition adds nothing to our knowledge then.

The claims of Bacon for the paternity of modern science or philosophy are very weak. But it is said (1) that the "Novum Organum", though seldom referred to by

(1) Cohen - Scientific Monthly, Dec. 1926 - Page 504



the authors of works on physics, is often quoted by metaphysical, ethical, and even theological writers. The question naturally arises, how far has the influence of Bacon affected what are called the moral as distinguished from the physical sciences? There is not sufficient data for determining to what degree the total absence of logic in the speech of the ordinary person and even in that of the educated statesman is due to Bacon's denunciation of syllogistic reasoning. Logic is taught at all our universities, but its affects are not always apparent. At any rate, it may be safely asserted that if Bacon had been very successful in his attempt to extinguish syllogistic altogether, matters would be worse than they are now. But he seems open to the reproach of being the originator of those philosophical errors on which modern materialism is based. He did not himself attribute the origin of knowledge exclusively to the senses; but the drift of his system, which denied or did not sufficiently recognise the value of ideas even in experiment, was undoubtedly in that direction. (1) There is a controversy as to the sincerity or insincerity with which Bacon professed Christianity. It is certain that there are many passages in his works which contain edifying sentiments eloquently and nobly expressed. (2) But it is impossible to settle the matter definitely.

(1) Wright - Scientific Monthly, Jan. 1928 - Page 36

(2) Nichol - Francis Bacon - Page 223

The materialistic tendencies of Bacon's principles become apparent the moment they began to be developed by those who might be called his disciples. In those hours of leisure which he devoted at Gorhambury to philosophical pursuits he sometimes permitted younger friends, of whom he thought well, to be his companions. Of these his chief favorite was Thomas Hobbes. It cannot be denied that Hobbes was an undisguised materialist. (1) His opinions on philosophical questions did not meet with ready acceptance, because they were published in connection with other opinions, on morals, on government, and on religion, of a most unpopular character. But after him came Locke who, taking advantage of the turn men's minds had now received in favor of experiment as the most fruitful source of knowledge, began to propound doctrines which denied to the native activity of the mind itself its due share in the acquisition, and attributed to the senses alone, or chiefly, an office in which they have but a subordinate part. Locke, however, did not assert the exclusive authority of the senses as the source of our ideas: he admitted reflection into partnership with sensation. We will not trace this school of thought in its progress, but it is to the point to notice that those men always spoke of Bacon as their prophet and precursor.

(1) Doherty - Page 309

Among later adherents of this school are Compté and John Mill. Mill was the disciple of Compté, though he soon began to show the flaws in the instruction of his teacher. But that has happened in every school of philosophy. It is remarkable that Mill differs from Bacon as to the value of successive generalization, which is considered by many the most meritorious feature in Bacon's system.

The Phenomenists inherit from Bacon their notions of the exclusive value of experience; they exaggerate to a length to which scarcely any one has gone before, but as on their own principles it cannot lead to certainty, it ceases in effect to be an instrument for the discovery of scientific truth.

Truth is the most elusive thing in this world and we are continually trying to shed new light on it, but it has been wisely said that there is nothing new except what is very old.

Bacon, the Founder of Modern Science

The popular belief that Francis Bacon was the founder of modern science is so openly in contradiction with all the facts of history and his own works that it is interesting to inquire how such a belief has been accepted

There is first the fable that there was no science before the 17th century. But there is also the fact that the foundations of modern science were laid before the publication of the "Novum Organum" in 1620. Names like those of Copernicus, Kepler, Galileo, Stevinus, Gilbert, and the mathematicians disprove the claim of Bacon that there was no well established science based on experience until he appeared on the scene. Ignorance cannot be offered as an excuse, for Bacon knew Harvey personally and must have known of his scientific work. Perhaps he was seeking favor with his extravagant statements in the eyes of King James?

Besides ignoring past progress Bacon actually opposed the constructive scientific achievements of his time - especially those which have figured in modern advancement. (1)

For example, he opposed the Copernican astronomy which had received strong confirmation. In his "De Augmentis" he writes of the "extravagant idea of diurnal

(1) Cohen - Scientific Monthly, Dec. 1926 - Page 504

motion of the earth, an opinion which we can demonstrate to be false." (1)

Kepler, Gilbert, and Galileo worked scientifically on this problem while Bacon offered very unsubstantial criticism.

Bacon also opposed the growing method of explaining physical phenomena as far as possible in the terms of mechanics. He wrote - "the human understanding is perverted by the observing of the power of mechanical arts." (2)

Bacon rejects the work of Gilbert. He calls his work with magnets a waste of time and he calls his fundamental discoveries in electricity and magnetism, which have proved basic, fables. (3)

As for his own contributions to science he failed to make any. Rather he made some very glaring errors. In the "Novum Organum" we read the following passage in which he confuses substance and accident:

"Thus

in gold are united the following circumstances; it is yellow, heavy, of a certain weight, malleable and ductile to a certain extent; it is not volatile, loses part of its substance by fire, melts in a peculiar manner, is separated and dissolved by particular methods, and so of the other Natures observable in gold. An axiom, therefore, of this kind deduces the

(1) De Augmentis Book III Chap. 4
 (2) Novum Organum Book I Chap. 66
 (3) Ibid. II 48

subject from the Forms of simple Nature. For he who has acquired the Forms and Methods of superinducing yellowness, ductility, stability, deliquescence, solution, and the like, and their degrees and modes, will consider and contrive how to unite them in any body, so as to transform it into gold." (1)

Bacon has here fallen into the common fault of identifying a substance by its accidents. If he had more carefully defined his terms he might have avoided this error.

A substance is that which exists by itself; an accident is that which exists in a substance. And that which makes a thing what it is is its essence.

To return to the case of Bacon. The color yellow is not the substance of gold, hence it cannot be its essence. Yellow is only an accident, for without the gold the color could not exist. All color is accident. Yellow never existed by itself in the concrete. If a substance is yellow it is not necessarily gold, nor if it is not yellow is it therefore not gold.

So with all the other properties of gold which Bacon mentions. They are all accidents by which we identify the substance, but which do not constitute the essence of the substance. If one accident does not form the essence, no collection of accidents can.

(1) Novum Organum II 5

To try to impose these accidents upon another substance and make a replica of the first substance is absurd, since accidents cannot change the essence of a thing. By reasoning this out before experimenting one would never waste his time trying to convert side-walk bricks into gold.

Voltaire said that Bacon anticipated Newton's discovery of the law of gravitation. But Newton's law is based on the Copernican system which Bacon rejected. Nor have those who claim this honor for Bacon noted his assertion that falling bodies lose weight. (1) Voltaire confused Bacon's knowledge that the speed of falling bodies increases as they approach the earth with the law of gravitation. The observations of Bacon went no deeper than that some bodies are heavy, some light, some neither.

Sometimes it is advanced that Bacon discovered heat to be a form of motion. But actually Bacon rejected the atomic theory and his method of induction led him to believe that the motion which produces heat "should take place not in the very minutest particles but rather in those of some tolerable dimensions." (2)

Others have urged that while Bacon did not himself make any direct contributions to science he founded the truth method of science, the method of induction.

(1) Novum Organum I 33

(2) Ibid. II 20

However, there is no record of any one having made an important discovery by following Bacon's method and its mechanical tables and its twenty-seven prerogative instances. Great scientists did pay Bacon tribute, but none of them used his method.

In his doctrine of the idols Bacon gives a vivid and eternal account of the difficulties that hinder the study of nature. But these appeals had been made before and science grows not on righteous exhortations, but on definite directions.

Bacon's failure is instructive to those who would observe. He began without any regard for previous thought, resolved not to anticipate nature, ready to let all facts occur before him. (1) Now the number of circumstances that can be noted about any object is indefinite. To those who would progress any existing knowledge is a great aid. Those who reject it become lost in a mass of details, either false or well-known for ages. The futility of the amateur scientist is made patent by the amateurish observations of Bacon.

How does it happen that Bacon is looked to as the founder of modern science? One explanation is that Bacon is quite readable, while the works of the scientists of his time and their predecessors, are inaccessible to the general public. The splendid rhetoric, pithy epigram, and forceful presentation

(1) Cohen - Scientific Monthly, Dec. 1926 - Page 507

carry the reader over the irrelevant and false ideas.

There is, too, a romantic appeal in thinking that all the mystery of this world can be solved by a simple method, the use of which requires no superior intelligence. It is charming to reduce all scientific puzzles to a simple system, but charming does not make it so.

Conclusions

The life of Bacon is not an inspiring one. We blame him justly for his unmanly acts. Excuses may be made for some of them, but a really noble character does not require excuses for any of his actions.

The versatile, but easily influenced, mind of Bacon was not a help in forming a strong character and it led him in strange paths.

Macaulay interprets Bacon's philosophy as a purely materialistic one, concerned only with worldly advancement.

Bacon did not set up a philosophical system, nor did he invent induction, but he did call the attention of men to a method of discovering truth which had been somewhat neglected.

Bacon cannot be hailed as the founder of modern science since many important discoveries were made before his time and since he himself opposed many of the scientific inventions that have figured in the progress of the world.

It would be well for posterity to lay aside the life and philosophy of Bacon, but to diligently read his essays.

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